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10/594,433	09/26/2006	Peter Healey	4359.11WOUS	2937
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/594,433

Applicant(s)

HEALEY ET AL.

Examiner

OMER MIAN

Art Unit

2461

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 10-15, 17-21, 23, 25-28, 30, 31, 34 and 35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10-15, 17-21, 23, 25-28, 30, 31, 34 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsman's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 06/24/2010
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/23/2010 has been entered.

Claim Objections

2. Claims 23 and 25 objected to because of the following informalities:

Claims 23 and 25 are dependent from claim number 35 and 34 respectively. The dependent claims must be numbered higher than the claim they depend from.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-4, 10-15, 17-18, 25-28, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over LANGE et al (US 2003/0103211) in view of BRYCE et al (US 2006/0011840).

Regarding claim 1, LANGE discloses *method of evaluating the position of a time-varying disturbance on a transmission link, the method comprising:*

copying, at least in part, an output signal from an optical pulse source (LANGE: ¶29, LD), such that there is a pair of signal copies by channeling light from the optical source onto first and second paths (LANGE: Fig. 1 and ¶8, ¶27, and ¶37, light source is split into two parts of signal, paths 112 and 114) such that the power of the optical source traveling along each path is shared between the signal copies and one signal copy travels along the first path in an outbound direction with the other signal copy traveling along the second path in the outbound direction (LANGE: Fig. 1, ¶37, ¶43, ¶44, a signal from a single source, where the source is divided into two paths and along both path the light travels in the outbound direction);

delaying one of the pulse copies relative to the other pulse copy in the outbound direction (LANGE: Fig. 1 and Fig. 2B, ¶8, ¶27, ¶44, a phase delay (difference) between the first and second beam);

combining light traveling in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120);

transmitting the combined light of the differentially delayed pair of signal copies onto the transmission link in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120 and transmitted onwards to an interface 134);

receiving in a return direction from the transmission link return signals comprising backscattered components comprising at least partially returned copies of said signal copies previously transmitted on said transmission link (LANGE: Fig. 1, 2B, ¶23, ¶28, ¶30 and ¶44, a return signal is received comprising scattered reflected return signals), *wherein at least one of said components has suffered a phase change caused by said time-varying disturbance* (LANGE: ¶44, phase modulation is shifted due to a sensed disturbance (break) on the link);

combining the received returned signal copies of a transmitted pair so as to produce a combination signal (LANGE: ¶28 and ¶34, couplers join the returning signals on the paths); and,

using a temporal characteristic in the combination signal to evaluate the position of the time-varying disturbance on the transmission link (LANGE: ¶44, using time and phase characteristics, the location of a break is detected).

LANGÉ does not explicitly disclose that *the power of the optical source traveling along each path is shared in a predetermined manner and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies*

However, BRYCE expressly discloses that the *power of the optical source traveling along each path is shared in a predetermined manner* (BRYCE: ¶50, the light intensity is split equally) *and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies* (BRYCE: ¶74, relative time of disturbances is included).

A person of ordinary skill in the art working with the invention of LANGÉ would have been motive to use the technique of BRYCE of predetermined intensity as it provides ability of simplifying processing the differences in the two signals. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LANGÉ and BRYCE in order to decrease processing complication when implementing the invention.

Regarding claim 2, LANGÉ modified by BRYCE, hereinafter LB, discloses method, *wherein the temporal characteristic* (LANGÉ: ¶44, using time and phase characteristics, the location of a break is detected) *includes the time at which a disturbance feature occurs in the combination signal* (BRYCE: ¶74, relative time of disturbances is included).

Regarding claim 3, LB discloses method, *wherein signal copies are returned as the signal copies travel along the transmission link by a process of backscattering* (BRYCE: ¶155, backscatter from distributed targets)

Regarding claim 4, LB discloses method, *wherein the optical pulse source signal copies are combined to give a combination signal that is distributed over time as the combined signal copy pulses travel along the transmission link* (LANGE: ¶144, signal is a combination of signals having difference in time and phase, hence distributed over time).

Regarding claim 8, claim is CANCELLED.

Regarding claim 9, claim is CANCELLED.

Regarding claim 10, LB discloses method, *wherein the differential delay is caused at an unbalanced interferometer coupled to an optical source, the interferometer having a first path and a second path, the transit time of the first path being longer than that of the second path, signal copies of a pair being caused to travel along a different respective path to one another* (LANGE: Fig. 4 and Fig. 1, ¶27 and ¶43-44 modulation performed to delay one of the signal and paths are different for the different).

Regarding claim 11, LB discloses method, *wherein the interferometer has a first coupling stage which is coupled to the source, the coupling stage being arranged to channel one portion of the incoming radiation intensity from the source along one path, and another portion of the incoming radiation intensity along the other path, so as to*

form the first and second signal copies (LANGE: ¶¶27 and ¶¶43-44, beam divided into two parts).

Regarding claim 12, LB discloses a method, *wherein the interferometer has a second coupling stage for combining radiation from the first and second paths, and for coupling the combined radiation to the common communications link* (LANGE: Fig. 1 and ¶¶27-30 and ¶¶43-44, beam divided into two parts and rejoined at the coupler).

Regarding claim 13, LB discloses a method, *wherein the signals returned from the second location are each channeled along the first and second paths by a second coupling stage, and wherein the so channeled signals are subsequently combined at the first coupling stage* (LANGE: Fig. 1 and ¶¶27-30 and ¶¶43, beam divided into two parts and rejoined at the coupler).

Regarding claim 14, LB discloses a method, *wherein the signal copies of a pair are delayed relative to one another at a first location, and wherein at disturbance is detectable at a second location remote from the first location* (LANGE: Fig. 1 and ¶¶27-30 and ¶¶43, beam divided into two parts and rejoined at the coupler).

Regarding claim 15, LB discloses a method *wherein each of the signal copies of a pair is disturbed by a detected disturbance* (LANGE: ¶¶23 and ¶¶62, break or inconsistency which affect the pair of beams is detected).

Regarding claim 16, claim is CANCELLED.

Regarding claim 17, LB discloses method, *wherein the output signals have an average phase-coherence time associated therewith of less than 1 pico seconds* (LANGE: ¶30, the coherence length is several hundreds of microns).

Regarding claim 18 LB discloses a method as claimed in claim 17, *wherein the signal copies of a pair have a differential delay time associated therewith* (LANGE: ¶27-30 delays are introduced between the signals), *the delay time being greater than the average phase-coherence time* (LANGE: ¶31, delay path length is significantly shorter than the delay path length).

LB does not explicitly disclose that *delay length is greater by a factor of at least 1000*.

However, it is generally considered to be within the ordinary skill in the art to adjust, vary, select or optimize the numerical parameters or values of any system absent a showing of criticality in a particular recited value. The burden of showing criticality is on Appellant. *In re Mason*, 87 F.2d 370, 32 USPQ 242 (CCPA 1937); *Marconi Wireless Telegraph Co. v. U.S.*, 320 U.S. 1, 57 USPQ 471 (1943); *In re Seather*, 492 F.2d 849, 181 USPQ 233 (CCPA 1945).

Regarding claim 26, LANGE expressly discloses *a monitoring station for monitoring a transmission link, the monitoring station comprising:*

a source for generating optical pulse signals (LANGE: ¶29, LD);

an interferometer stage for copying at least in part the optical pulse signals from the source such that for each optical pulse signal there is a pair of pulse signal copies (LANGE: Fig. 1 and ¶8, ¶27, and ¶37, light source is split into two parts of signal, paths 112 and 114) the interferometer stage having a delay stage to differentially delay one copy of each pulse signal relative to the other copy (LANGE: Fig. 1 and Fig. 2B, ¶8, ¶27, ¶44, a phase delay (difference) between the first and second beam);

an output for launching the differentially delayed pulse signal copies onto the transmission link (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120 and transmitted onwards to an interface 134); and

a processor circuit (LANGE: Fig. 1, electronics);

wherein the interferometer stage is arranged to receive signal copies returned by a process of backscattering from the link and to combine the signal copies so as to produce an interference signal (LANGE: Fig. 1, 2B, ¶23, ¶28, ¶30 and ¶44, a return signal is received comprising scattered reflected return signals), wherein at least one of said backscattered signal copies has suffered a phase change (LANGE: ¶44, phase modulation is shifted due to a sensed disturbance (break) on the link),

wherein the processor circuit is arranged to store the interference signal in association with an indication of a temporal characteristic of the return signal (LANGE: ¶7, ¶26-27, electronics processing the signal causing the disturbance), and

wherein when said phase change is caused by a time-varying disturbance (LANGE: ¶44, using time and phase characteristics, the location of a break is detected),

said interference signal stored in association with an indication of a temporal characteristic of the return signal enables the position of the disturbance to be determined from the time of return of phase-modulated backscattered components of said returned pulse signal copies (LANGE: ¶44, using time and phase characteristics, the location of a break is detected).

LANGE does not explicitly disclose that copies returned by a process of *distributed backscattering*.

However, BRYCE explicitly discloses copies returned by a process of *distributed backscattering* (BRYCE: ¶55, backscatter from distributed targets).

A person of ordinary skill in the art working with the invention of LANGE would have been motive to use the technique of BRYCE of distributed backscattering as it provides ability of implementation over wide range of wavelengths increasing the applicability of the invention (BRYCE: col. 2-col.3). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LANGE and BRYCE in order to increase industrial applicability of the invention

Regarding claim 27, LB *discloses monitoring station, wherein the interference signal is a time-distributed signal which varies with time, and wherein a temporal characteristic is the time variation of the return signal* (LANGE: ¶44, signal is a combination of signals having difference in time and phase, hence distributed over time).

Regarding claim 28, LB discloses *monitoring station, wherein the interference signal is a time-distributed signal, and the processor circuit is arranged to sample the interference signal at intervals* (LANGE: Fig. 4, and Fig. 1, ¶62 and ¶53, sampled at a frequency and processed), *and to store the samples in association with a respective return time for each sample* (LANGE: Fig 1, ¶53 and ¶43, where a delay is induced and a memory is present).

Regarding claim 29, claim is CANCELLED.

Regarding claim 34, LANGE expressly discloses *an apparatus for evaluating the position of a time-varying disturbance on a transmission link, the apparatus including:*

means for copying, at least in part, an output signal from an optical pulse source (LANGE: ¶29, LD), *such that there is a pair of signal copies by channeling light from the optical source onto first and second paths* (LANGE: Fig. 1 and ¶8, ¶27, and ¶37, light source is split into two parts of signal, paths 112 and 114) *such that the power of the optical source traveling along each path is shared between the signal copies and one signal copy travels along the first path in an outbound direction with the other signal copy traveling along the second path in the outbound direction* (LANGE: Fig. 1, ¶37, ¶43, ¶44, a signal from a single source, where the source is divided into two paths and along both path the light travels in the outbound direction);

delay means for delaying one of the pulse copies relative to the other pulse copy in the outbound direction (LANGE: Fig. 1 and Fig. 2B, ¶8, ¶27, ¶44, a phase delay (difference) between the first and second beam);

means for combining light traveling in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120);

means for transmitting the combined light of the differentially delayed pair of signal copies onto the transmission link in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120 and transmitted onwards to an interface 134);

wherein said means for combining provides means for receiving in a return direction from the transmission link return signals comprising backscattered components comprising at least partially returned copies of said signal copies previously transmitted on said transmission link (LANGE: Fig. 1, 2B, ¶23, ¶28, ¶30 and ¶44, a return signal is received comprising scattered reflected return signals), wherein at least one of said components has suffered a phase change caused by said time-varying disturbance (LANGE: ¶44, phase modulation is shifted due to a sensed disturbance (break) on the link);

wherein said means for copying provides means for combining the received returned signal copies of a transmitted pair so as to produce a combination signal (LANGE: ¶28 and ¶34, couplers join the returning signals on the paths); and,

means for evaluating using a temporal characteristic in the combination signal to evaluate the position of the time-varying disturbance on the transmission link (LANGE: ¶44, using time and phase characteristics, the location of a break is detected).

LANGE does not explicitly disclose that the power of the optical source traveling along each path is shared in a predetermined manner and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies

However, BRYCE expressly discloses that the power of the optical source traveling along each path is shared in a predetermined manner (BRYCE: ¶50, the light intensity is split equally) and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies (BRYCE: ¶74, relative time of disturbances is included).

A person of ordinary skill in the art working with the invention of LANGE would have been motive to use the technique of BRYCE of predetermined intensity as it provides ability of simplifying processing the differences in the two signals. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LANGE and BRYCE in order to decrease processing complication when implementing the invention.

Regarding claim 35, *LANGE expressly discloses an apparatus for evaluating the position of a time-varying disturbance on a transmission link, the apparatus including:*

an optical pulse source (LANGE: ¶29, LD);

a first differential power splitter for copying, at least in part, an output signal from an optical pulse source (LANGE: ¶29, LD), such that there is a pair of signal copies by channeling light from the optical source onto first and second paths (LANGE: Fig. 1 and ¶8, ¶27, and ¶37, light source is split into two parts of signal, paths 112 and 114) such that the power of the optical source traveling along each path is shared between the signal copies and one signal copy travels along the first path in an outbound direction with the other signal copy traveling along the second path in the outbound direction (LANGE: Fig. 1, ¶37, ¶43, ¶44, a signal from a single source, where the source is divided into two paths and along both path the light travels in the outbound direction);

delay stage for delaying one of the pulse copies relative to the other pulse copy in the outbound direction (LANGE: Fig. 1 and Fig. 2B, ¶8, ¶27, ¶44, a phase delay (difference) between the first and second beam);

a coupler for combining light traveling in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120);

a transmitter for transmitting the combined light of the differentially delayed pair of signal copies onto the transmission link in the outbound direction (LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120 and transmitted onwards to an interface 134);

wherein said coupler provides means for receiving in a return direction from the transmission link return signals comprising backscattered components comprising at least partially returned copies of said signal copies previously transmitted on said transmission link (LANGE: Fig. 1, 2B, ¶23, ¶28, ¶30 and ¶44, a return signal is received

comprising scattered reflected return signals), *wherein at least one of said components has suffered a phase change caused by said time-varying disturbance* (LANGE: ¶44, phase modulation is shifted due to a sensed disturbance (break) on the link);

wherein said first differential power splitter for copying provides means for combining the received returned signal copies of a transmitted pair so as to produce a combination signal (LANGE: ¶28 and ¶34, couplers join the returning signals on the paths); and,

a signal processing system for evaluating using a temporal characteristic in the combination signal to evaluate the position of the time-varying disturbance on the transmission link (LANGE: ¶44, using time and phase characteristics, the location of a break is detected).

LANGE does not explicitly disclose that *the power of the optical source traveling along each path is shared in a predetermined manner and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies*

However, BRYCE expressly discloses that *the power of the optical source traveling along each path is shared in a predetermined manner* (BRYCE: ¶50, the light intensity is split equally) *and that the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies* (BRYCE: ¶74, relative time of disturbances is included).

A person of ordinary skill in the art working with the invention of LANGE would have been motive to use the technique of BRYCE of predetermined intensity as it

provides ability of simplifying processing the differences in the two signals. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LANGE and BRYCE in order to decrease processing complication when implementing the invention.

Regarding claim 25, LB discloses an apparatus *wherein delay means the delay means is provided by an interferometer stage, the interferometer stage having first and second transmission legs* (LANGE: ¶43 and ¶27-31 and Fig. 1, two transmission legs exist) *and coupling means for coupling to or from the first and second legs* (LANGE: fig. 1 and ¶27-31 coupler is connected to the legs), *and wherein the means for copying output signals and the means for combining the received signal copies are formed in common by the coupling means* (LANGE: ¶27 and Fig. 1, coupler and Y-junction is in the same sensor system).

6. Claims 5-7 rejected under 35 U.S.C. 103(a) as being unpatentable over LB as applied to claim 1 above, further in view of REINGANG et al (US 7110677).

Regarding claim 5, LB discloses method, *wherein the combination signal is sampled at temporal positions* (LANGE: ¶62 and Fig. 1, the detector is sampling at a frequency.)

LB does not expressly disclose that *sampling is at a first set of spaced apart temporal positions and at a second set of temporal position, and a wherein the first and second sampled sets are compared in a comparison step*

However, REINGANG expressly discloses that *sampling is at a first set of spaced apart temporal positions and at a second set of temporal position, and a wherein the first and second sampled sets are compared in a comparison step* (REINGANG: col. 10 line 65-col. 11 line 13, optical signals are detected by sampling based on different delay and hence different sampling sets and the sampled signals are compared).

A person of ordinary skill in the art at working with the invention of LB would be motivated to use the method of detecting of interleaved optical signals of REINGANG as it provides improved efficiency of detecting signals is achieved as they signals do not overlap (REINGANG: col. 1 lines 55-60). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LB and REINGANG in order to increase industrial applicability of the invention.

Regarding claim 6, the combined teachings of LB and REINGANG, hereinafter LBR, discloses method, *wherein the temporal positions of the first and second sets are interleaved* (REINGANG: col. 10 lines 65- col. 11 line 13, the positions are interleaved).

Regarding claim 7, LBR discloses method, *wherein the comparison step involves generating a set of data which is at least in part dependent on the difference*

between the first and second sets (LANGE: ¶44, difference between the received set of sampled signals).

7. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over LB as applied to claim 1 above, further in view of DAKIN et al (US 4885462).

Regarding claim 19, LB discloses *a method as claimed in claim 1 above.*

LB does not explicitly disclose *where an optical fiber is extending, the optical fiber being arranged such that movement of the vehicle causes a disturbance along the optical channel, the optical fiber extending along a guide track, the guide track being arranged to guide the movement of a vehicle*

However, DAKIN expressly discloses *where an optical fiber is extending, the optical fiber being arranged such that movement of the vehicle causes a disturbance along the optical channel, the optical fiber extending along a guide track, the guide track being arranged to guide the movement of a vehicle* (DAKIN: col. 3 line 35-40, vehicle movement is along a rail).

A person of ordinary skill in the art working with the invention of LB would have been motivated of using the technique taught by DAKIN of using disturbances to control and guide vehicle as it provides an industrial application of the invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to

combine the inventions of LB and DAKIN, hereinafter LBD, in order to increase applicability and consumer market of the invention.

Regarding claim 21, LBD discloses method, *wherein the guide track has the form of one or more rails for guiding the movement of a train* (DAKIN: col. 3 line 35-40, vehicle movement is along a rail).

8. Claims 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over LB as applied to claim 35 above, further in view of SORIN et al (US 5982791).

Regarding claim 23, LB discloses an apparatus as set forth in claim 35 above where monitoring means is disclosed (LANGE: Fig. 3-6, and ¶23, ¶62, where signal is monitored).

LB does not explicitly disclose *monitoring means includes a display device for displaying the combination signals as a function of time*.

However, SORIN discloses *monitoring means includes a display device for displaying the combination signals as a function of time* (SORIN: col. 3, lines 13 - 27, spectrum analyzer is used to monitor the optical signal).

A person of ordinary skill in the art working with the invention of LB would have been motivated of using the technique taught by SORIN as it provides more real-time and dynamic adjustment of back-reflecting the optical carrier (SORIN: col. 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to combine the inventions of LB and SORIN in order to increase applicability and consumer market of the invention.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over LBD as applied to claim 19 above, further in view of DALLAIRE et al (US 4855915).

Regarding claim 20, LBD, discloses a method, *wherein the path of the optical channel crosses the track.*

LBD does not expressly disclose that the crossing is *at intervals*

However, DALLAIRE discloses that the crossing is *at intervals* (DALLAIRE: col. 1 line 40 – col. 2 line 64, channels cross the path of the vehicle at intervals).

A person of ordinary skill in the art working with the invention of LBD would have been motivated of using the technique taught by DALLAIRE of using disturbances to control and guide vehicle as it provides a way to detect any accidents or interruption in the travel of the vehicle as at intervals can always be predetermined. Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to combine the inventions of LBD and DALLAIRE, hereinafter LBDD, in order to increase safety of the vehicle travel in case of an emergency.

10. Claim 30-31 is rejected under 35 U.S.C. 103(a) as being unpatentable over DAKIN (US 4885462) in view of LANGE et al (US 2003/0103211) further in view of BRYCE et al (US 2006/0011840).

Regarding claim 30, DAKIN discloses a *sensing system for sensing the position of a moving vehicle, the sensing system comprising:*

a guide track for guiding the movement of the vehicle (DAKIN: col. 3 lines 35-41, rail track for guiding movement of a vehicle);

an optical transmission link extending along the guide track (DAKIN: col. 3 lines 3-41, and Fig. 1, optical fiber extending to the track); *and,*

monitoring apparatus coupled to the optical transmission link (DAKIN: Fig. 1 col. 2 lines 8-36, monitoring detectors and apparatus connected to the optical fiber), *wherein the optical transmission link is mechanically coupled to the guide track such that movement of the vehicle causes a moving disturbance to be sensed by a sensing optical signal pulse signals propagating along the optical transmission link* (DAKIN: Fig. 1 col. 2 lines 8-36, col. 3 lines 3-41, fiber is mechanically coupled to guide track such that movement of the vehicle causes disturbance and optical beam is used to sense that disturbance/influence),

the monitoring apparatus being configured to

(i) detect a said sensing optical signal from the optical fiber, wherein said sensing light signal is indicative of the moving disturbance (DAKIN: Fig. 1, col. 1 line 43-60 and col. 2 line 3-36, detection of light indicative of parameter acting at a point),

(ii) evaluate at least one temporal characteristic of the sensing optical signal (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-36, evaluating rate of change of phase of the signal), *and*

(iii) *in dependence on the evaluated temporal characteristic, determine an indication of the position of the moving disturbance along the optical transmission link so that the position of the vehicle along the track can be sensed* (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41, rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track).

DAKIN does not expressly disclose a source for generating optical pulse signals; an interferometer stage for copying at least in part the optical pulse signals from the source such that for each optical pulse signal there is a pair of pulse signal copies the interferometer stage having a delay stage to differentially delay one copy of each pulse signal relative to the other copy;

an output for launching the differentially delayed pulse signal copies onto the transmission link and

a processor circuit;

wherein the interferometer stage is arranged to receive signal copies returned by a process of distributed backscattering from the link and to combine the signal copies so as to produce an interference signal, wherein at least one of said backscattered signal copies has suffered a phase change

wherein the processor circuit is arranged to store the interference signal in association with an indication of a temporal characteristic of the return signal and

wherein when said phase change is caused by a time-varying disturbance, said interference signal stored in association with an indication of a temporal characteristic of the return signal enables the position of the disturbance to be determined from the time

of return of phase-modulated backscattered components of said returned pulse signal copies.

However LANGE expressly discloses monitoring apparatus comprising a source for generating optical pulse signals (LANGE: ¶29, LD);

an interferometer stage for copying at least in part the optical pulse signals from the source such that for each optical pulse signal there is a pair of pulse signal copies (LANGE: Fig. 1 and ¶8, ¶27, and ¶37, light source is split into two parts of signal, paths 112 and 114) the interferometer stage having a delay stage to differentially delay one copy of each pulse signal relative to the other copy (LANGE: Fig. 1 and Fig. 2B, ¶8, ¶27, ¶44, a phase delay (difference) between the first and second beam);

an output for launching the differentially delayed pulse signal copies onto the transmission link(LANGE: ¶27, ¶43, the light traveling outbound is combined at coupler 120 and transmitted onwards to an interface 134); and

a processor circuit (LANGE: Fig. 1, electronics);

wherein the interferometer stage is arranged to receive signal copies returned by a process of backscattering from the link and to combine the signal copies so as to produce an interference signal (LANGE: Fig. 1, 2B, ¶23, ¶28, ¶30 and ¶44, a return signal is received comprising scattered reflected return signals), wherein at least one of said backscattered signal copies has suffered a phase change (LANGE: ¶44, phase modulation is shifted due to a sensed disturbance (break) on the link),

wherein the processor circuit is arranged to store the interference signal in association with an indication of a temporal characteristic of the return signal (LANGE:

¶7, ¶26-27, electronics processing the signal causing the disturbance), and

wherein when said phase change is caused by a time-varying disturbance (LANGE: ¶44, using time and phase characteristics, the location of a break is detected), said interference signal stored in association with an indication of a temporal characteristic of the return signal enables the position of the disturbance to be determined from the time of return of phase-modulated backscattered components of said returned pulse signal copies (LANGE: ¶44, using time and phase characteristics, the location of a break is detected).

A person of ordinary skill in the art working with the invention of DAKIN would have been motivated to use the interferometer of LANGE as it provides a relatively simple and low-cost sensing which is accurate and has a high resolution (LANGE: ¶6). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the invention of DAKIN with the interferometer of LANGE in order to achieve an economical and yet an accurate system of disturbance detection (LANGE: ¶6).

DAKIN modified by LANGE, hereinafter DL, does not explicitly disclose that copies returned by a process of distributed backscattering.

However, BRYCE explicitly discloses copies returned by a process of distributed backscattering (BRYCE: ¶55, backscatter from distributed targets).

A person of ordinary skill in the art working with the invention of DL would have been motive to use the technique of BRYCE of distributed backscattering as it provides ability of implementation over wide range of wavelengths increasing the applicability of the invention (BRYCE: col. 2-col.3). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of DL and BRYCE in order to increase industrial applicability of the invention

Regarding claim 31, DAKIN discloses a *sensing method of sensing the position of a vehicle moving along a guide track*,

wherein there is provided an optical transmission link extending along the guide track (DAKIN: col. 3 lines 3-41, and Fig. 1, optical fiber extending to the track), *and*

monitoring apparatus coupled to the optical transmission link, the optical transmission link being mechanically coupled to guide track such that movement of the vehicle causes a moving disturbance to be sensed by copies of a sensing optical pulse signal propagating along the optical transmission link (DAKIN: Fig. 1 col. 2 lines 8-36, col. 3 lines 3-41, fiber is mechanically coupled to guide track such that movement of the vehicle causes disturbance and optical beam is used to sense that disturbance/influence), *the method comprising:*

(i) detecting a light signal from the optical transmission link, indicative of the moving disturbance (DAKIN: Fig. 1, col. 1 line 43-60 and col. 2 line 3-36, detection of light indicative of parameter acting at a point),

(ii) evaluating at least one temporal characteristic of the light signal (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-36, evaluating rate of change of phase of the signal), and

(iii) in dependence on the evaluated temporal characteristic, determining an indication of the position of the moving disturbance along the optical fiber (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41, rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track); and

(iv) inferring the position of the vehicle from the position of the disturbance along the optical channel (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41, rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track).

DAKIN does not explicitly disclose that the disturbance is sensed by *combined differentially delayed copies of a sensing optical pulse signal propagating in an outward direction along the optical transmission link,*

that the detecting is of backscattered signal components of said outwardly propagating combined differentially delayed copies of said optical signal,

that the temporal characteristic is of the detected backscattered signal components

and wherein the position of the disturbance is determined from the time of return of phase-modulated backscattered components.

However, LANGE expressly discloses that the disturbance is sensed by *combined differentially delayed copies of a sensing optical pulse signal propagating in an outward direction along the optical transmission link* (LANGE: Fig. 4 and Fig. 1, ¶27 and ¶43-44 modulation performed to delay one of the signal and paths are different for the different),

that the detecting is of *backscattered signal components of said outwardly propagating combined differentially delayed copies of said optical signal* (LANGE: Fig. 1, 2B, ABSTRACT, ¶23, ¶28, ¶30 and ¶44, a return signal is received comprising scattered reflected return signals),

that the temporal characteristic is of *the detected backscattered signal components* (LANGE: ABSTRACT, and ¶28, ¶44, using time and phase characteristics, the location of a break is detected and signal is received comprising scattered reflected return signals)

A person of ordinary skill in the art working with the invention of DAKIN would have been motivated to use the interferometer of LANGE as it provides a relatively simple and low-cost sensing which is accurate and has a high resolution (LANGE: ¶6). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the invention of DAKIN with the interferometer of LANGE in order to achieve an economical and yet an accurate system of disturbance detection (LANGE: ¶6).

DL does not explicitly disclose that *the position of the disturbance is determined from the time of return of phase-modulated backscattered components*

However, BRYCE expressly discloses that *the position of the disturbance is determined from the time of return of phase-modulated backscattered components* (BRYCE: ¶174, relative time of disturbances is included)

A person of ordinary skill in the art working with the invention of DL would have been motivated to use the technique of BRYCE as it provides ability of simplifying processing the differences in the two signals using predetermined intensity values. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of DL and BRYCE in order to decrease processing complication when implementing the invention.

Response to Arguments

11. Applicant's arguments with respect to claims 1-35 have been considered but are moot in view of the new ground(s) of rejection.
12. Applicant's arguments filed 06/23/2010 have been fully considered but they are not persuasive.

Applicant argues, "Even if combined as suggested in the Office Action, Lange fails to remedy the deficiencies of Crawford. Further, the Office Action cites Lange as disclosing that the components are backscattered components, after conceding that Crawford does not disclose such a feature. Lange, however, describes splitting a signal into two copies, phase modulating both signal copies (using phase modulators 118, 116), combining the modulated phase copies using a coupler 120, optionally further

delaying the combined modulated signal using a delay loop (124) before sending the combined modulated signal into a device or optical fiber to be tested (150). (See Lange at para. [0043] et seq.) In Lange, phase modulation is applied to the sensing signals at a known location. Lange does not disclose or suggest using backscattered signal components whose phase-modulation is induced by the disturbance, and using this to detect the location of the disturbance which has caused the phase modulation in the manner of the invention presented in the amended claims. Refer, for example, to paragraph [0044] of Lange in contrast with amended claim 1..." (Applicant's Response Page 20)

Examiner respectfully disagrees with the above argument. Applicant takes a position that since both the signals are being modulated in *one of an example embodiment* of LANGE, it does not disclose using backscattered signal components whose phase-modulation is induced by the disturbance, and using this to detect the location of the disturbance which has caused the phase modulation in the manner claimed. This position is invalid. Paragraph 43 of LANGE expressly discloses that "...The reflected [combined] light is split into a component passing on fiber 132 and waveguide 112, and a component passing on fiber 134 and waveguide 114, where a modulation may be applied by modulator 116. The two components are suitably rejoined at Y-junction 110 and passed through coupler 104 to detector 108" LANGE further discloses in Paragraph 44 that component (2) and (3) would have identical distance *although* the "modulation will be shifted [changed/effectuated/caused]" when the light passes the *sensed device*. This change in modulation is used to calculate the

location of the break in fiber, for example. A person of ordinary skill in the art would reasonably interpret this as using backscattered signal components whose phase-modulation is induced by the disturbance, and using this to detect the location of the disturbance which has caused the phase modulation in the manner claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMER MIAN whose telephone number is (571)270-7524. The examiner can normally be reached on Monday-Thursday 8:30am-6pm and Fridays 8:30am-12:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, HUY VU can be reached on (571)272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/O. M./
Examiner, Art Unit 2461

/Jason E Mattis/
Primary Examiner, Art Unit 2461